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ABSTRACT

In 1982 the Dade County Public Schools (Florida) began developing test item banks for secondary subject areas, because other testing programs have limited utility for assessing the quality of curriculum, instruction, or learning in specific content areas. In May 1984, the approximately 17,000 seventh graders enrolled in Life Science and the approximately 10,500 eighth to twelfth graders enrolled in Algebra I were tested using two forms of these objectives based multiple choice tests. This report summarizes the results in three ways: (1) districtwide results by total score and by major objective; (2) the pattern of school-by-school results; and (3) the extent to which schools' subject area results differ beyond that "expected" on the basis of the types and backgrounds of the students enrolled. The average percentage correct on the Life Science test was approximately 46. The average percentage correct on the Algebra I test was approximately 55. Recommendations based on these low results include a thorough program review in both curriculum areas. (BS)

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ED256795

DADE COUNTY PUBLIC SCHOOLS

SUBJECT AREA TEST RESULTS:

LIFE SCIENCE and ALGEBRA I

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OFFICE OF EDUCATIONAL ACCOUNTABILITY
Testing Department

Spring 1984

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Life Science and Algebra 1 Subject Area Test Results

I. Background

Almost two years ago, this district made a commitment to begin developing banks of test items for secondary subject areas, including Algebra 1, Life Science, Biology, and U.S. History. This commitment, supported by the Superintendent and the Board, stemmed in large part from the general and long standing perception that neither the state minimum performance tests nor the districtwide norm referenced test provided an adequate basis for insuring a quality program in secondary level, non-basic-skill areas. Quite simply, no matter how appropriate these existing programs may be for their intended purposes, they have very limited utility for assessing the quality of curriculum, instruction, or learning in specific content areas.

The Executive Director of Elementary and Secondary Instruction identified Life Science and Algebra 1 as the first two subjects to be targeted. The objectives for these two areas were reviewed, and training was conducted in writing objective clarification statements and multiple choice test items. Test items were written by local teachers, and field-tested during the 1982-83 school year. Approximately one-half of these items were printed, along with supporting statistical and descriptive information (skill clarification statements and item specifications). The resulting Item Banks for Algebra 1 and Life Science were distributed to school principals in late winter, 1984. Sufficient numbers of copies for the Algebra 1 and Life Science teachers were included.

In mid May 1984, the approximately 17,000 seventh graders enrolled in Life Science and the approximately 10,500 eighth to twelfth graders enrolled in Algebra 1 (or Accelerated Algebra 1) were tested.[1]

In each class of Algebra 1 or Life Science two different forms of the test were administered, each containing 36 questions. Although most questions on the two forms were different, each of the two forms contained several common questions. This two-form approach was used to ensure that each test was short enough to be administered in a single class period while also insuring that the total number of questions in the two forms was sufficient to cover most of the district objectives.

After testing, a number of students and teachers were interviewed at 17 schools for Life Science and at 22 for Algebra 1. Generally, the majority of the students thought the tests were fair and that they were easy. For the 10% of the students who thought the tests were not fair, the prevailing reason was that the topics for the last one or two test questions had not yet been covered in their class. Relatedly, the change recommended most often by teachers (about ½ of them) was to test two or three weeks later, at the very end of the second semester.

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[1] Life Science is required of all seventh graders. Algebra 1 is an elective, generally taken by the very adept mathematics students as eighth grade Accelerated Algebra, or by "above average" students as ninth grade Algebra 1, and by average students in the tenth or later grades.

Teachers were also asked if they had received the skill/objective clarification and practice test item materials. Surprisingly, about one in four Life Science teachers and one in ten Algebra 1 teachers reported that they had not been given the materials, a consideration that may help explain the results, particularly those for Life Science.[2] All of those teachers who had received the materials and were encouraged to use them (about 50% of the Life Science and 60% of the Algebra 1 teachers), found the material useful.

The districtwide results for the Life Science and Algebra 1 tests are summarized in the following pages. The summary is presented in terms of three general topics, the districtwide results by total score and by major objective, the pattern of school-by-school results, and the extent to which schools' subject area results differ beyond that "expected" on the basis of the types and backgrounds of the students enrolled.

In reviewing these results the reader should bear in mind the following points:

Unlike commercial tests, these tests focus explicitly on the district objectives for the two courses. When the tests were compiled, the high priority objectives were assessed with more items than low priority objectives; thus, there should be close agreement between the test content and that of instruction. Additionally, a number of items included in each test were taken directly from the materials distributed earlier to the schools. And, when the items were selected for the tests, preference was given to the easier items partly because it was felt that the easier items should be used in the first testing to offset the fact that schools received the item bank materials mid-year, rather than at the beginning of the year as would have been preferred.

II. Life Science Results

A. Districtwide and By-Objective

On the two Life Science tests the average score was 16.5 correct of the 36 items on the test, or 45.8% correct; the middle 50% of the students scored from 12 to 20 (33.3% to 55.5% correct).[3] Thus, the average Life Science student correctly answered slightly less than one-half of the questions on the district objectives; the student at the 25 percentile correctly answered about one-third of the questions; while the student at the 75 percentile correctly answered slightly over one-half of the questions. Quite clearly, the overall level of achievement in Life Science as measured by the two Life Science tests, was not high and warrants substantial improvement.

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[2] Principals were not interviewed, but after testing at least three called and stated that the item banks for one or the other test had not been received.

[3] If every student answered every question by guessing, the chance score would be 7.2 items, or 20%, correct, for both Life Science and Algebra 1.

The objective-by-objective districtwide results for Life Science are displayed in Chart I (page 13). The vertical line at 45.8 represents the district average percent-correct across all items in the two tests.

One grouping suggested by the data in Chart I is that of the topics coded A01 through A05, which relate to scientific data and experimentation. These results suggest that students are knowledgeable of the manipulative aspects of experimentation, but perform less well on the higher skills related to the elements of the experimental method (parts of an experiment and nature of data).

Another grouping, characterized by topic codes A18 through B05, seems relatively high because the grouping tends to represent skill areas being taught at the time of testing.

Skill A14 (Osmosis and Diffusion), for which achievement is low, is apparently a particularly difficult concept, and there may be a need for the development of alternative teaching strategies and/or additional instructional materials for this skill area.

For topic A16 ("Differentiate between the Kingdoms"), which also represents a low achievement area, there are differences in the information presented by different textbooks currently in use. Some (low level) texts do not discuss the kingdoms at all; others cite only three kingdoms.

While considerable material has been distributed to teachers on these topics, additional communication to teachers and possibly a required inservice on the five currently acknowledged kingdoms may be warranted.

Finally, a logical grouping of Topics B06 through B19 is suggested by Chart I, in that these topics tend to be below the test average. Interviews conducted during testing suggest that the topics in group B06 through B19 had not yet been taught in some classrooms at the time of testing. It is currently planned that future tests like this one would be conducted as late as possible in the school year; however, this finding also suggests a need to re-examine the instructional time allocations for the various objectives to insure that all required topics will have been covered by the end of the school year.

B. School Patterns

School-by-school average number correct are presented in Table I (page 15) under the LIFE SCIENCE, Actual Mean column.

The school means on Life Science range from a low of about 11 (31.1%) correct to a high of about 21 (59.4%) correct on the 36 item tests. Thus, at the lowest scoring school, the average student gets about one-third of the questions correct and the below average student less than one-third; at the highest scoring junior high, the average student gets slightly over one-half correct. Because of the way the tests were constructed (see I above), these results, as well as those for the district, are viewed as problematic and warranting a review of the curriculum and the instruction process in most schools.

The extent to which schools' performance differed beyond that expected is described for both Life Science and Algebra 1 in a later section of this report.

III. Algebra 1 Results[4]

A. Districtwide and By-Objective

On the two Algebra 1 tests, the average score on the 36 item tests was approximately 19.6, or 54.8% correct. The middle 50% of the scores ranged from 13 (36%) to 25 (67%), the lower 25% scoring below 13 and the upper 25% scoring above 25. Thus, while the Algebra 1 scores are somewhat higher than those for Life Science, they also are somewhat disappointing, particularly the number of students scoring in the range of 14 and lower, given that the course is selective because of its elective nature and given that the tests focused exclusively on district objectives.

Chart 2 (page 14) presents in graphic format the average percentage of questions answered correctly for each of the ten major topic areas for Algebra 1. The vertical line at 54.8 represents the district average-percent-correct across all items in the two tests. For the ten topics, five are above the average and five are below.

The overall profile presented by the bar graphs is one which is low for the two beginning and two ending topics, and comparatively high for the "middle" topics, with the exception that one topic (Topic IV: Linear Equations) is low.

Of the five skills below the test average line, the lower scores on topics IX (Irrational Numbers and Radical Expressions) and X (Quadratic Equations) might be due to time of testing. It is possible that these topics had not been taught in some classes by the time of testing.

There is, no readily available explanation for the level of achievement indicated by performance on Topics II (One variable equations/inequalities) and IV (Linear equations). Examination of the Algebra 1 Item Bank provides examples of questions like those on the test. For example:

II-A3 If $x+2(x-3)= 4-(x+1)$, then $x=?$

and IV-A5 (solve the following simultaneous equations:) $x+2y=6$
$-x+y=3$

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[4] Results for Algebra 1 and Accelerated Algebra (8th grade only) are considered together here. Recall the footnote on Algebra 1 scheduling from page 1.

Examination of these sample items suggested that these two topic areas have in common the actual solution of equations, as contrasted to algebraic manipulation of formulas, or concepts of algebraic relationships. While additional study by subject area specialists will be required before firm conclusions can be drawn, more curriculum emphasis and/or increased instructional time for these two topics appears indicated.

B. School Patterns

The school-by-school average number correct are presented in Table I under the ALGEBRA, Actual Mean column.

The range of the Algebra 1 school means is approximately 18 points, from a low of about 12 to a high of approximately 30. In terms of percent of items correct, these means range from 33.3% to 83.3%. Thus, at the lowest scoring schools, the average student correctly answered one third of the test questions, below average students correctly answering still fewer questions.

On the positive side, several schools had averages at or above 27 (3/4 of the items). This is a positive level of achievement, particularly on the first administration of the tests. Above average students at these schools often did quite well on the tests, missing only 2 or 3 of the test questions.

As suggested by the scheduling practices described earlier (pg. 1 footnote), the average Algebra 1 score for the junior highs was above that for the senior highs, 22.3 as compared to 16.7. This 5 point difference will be investigated in detail in later portions of this report. At this juncture, it is sufficient to note that the magnitude of the difference may indicate that there are at least two different levels of Algebra 1 being offered (not including Accelerated Algebra) and that these two levels might be better described by different objectives and course titles.

School Adjusted Scores for Life Science and Algebra 1

The school patterns discussed earlier for Life Science and Algebra 1 describe the scores as they occurred, i.e. the actual scores. These scores, as do all "actual" achievement measures, reflect not only the performance of the students in the particular course, at the particular school, but also the students' prior achievement history, socioeconomic status, and so on.

In order to provide school-level scores which are relatively free of these prior, extra-school influences a series of actuarial analyses were conducted on the Life Science and Algebra 1 scores. Procedurally, the analyses compare the subject area scores of students who are similar with regard to prior (1983) Stanford score, ethnicity, and for Algebra 1, grade level. (Grade is not a factor for Life Science as all students are current seventh graders).

For example, the Algebra 1 score of an Hispanic ninth grade student, who on the previous year's Stanford Math Applications test scored at the national average, is compared to the <u>average</u> Algebra 1 score of <u>all similar students</u> taking the test. If the student's score is 6 points higher than this average, the student's residual score is +6; if it is 4 points lower, the residual score is -4. (The average score of similar students is called the expected score, expected in an actuarial sense. In all, each student, and school, has three Algebra 1 scores: the actual score, the expected score, and the difference between these two, the residual score.)

These residual scores are then averaged for the students at each school. The extent to which the school's average is different from zero represents the extent to which the Algebra 1 students at the school scored different from their similar cohorts throughout the district. (The Life Science residual scores are, of course, interpreted in the same way.)

Consider next some of the school-level factors which may affect a school's residual score. Principal among these are:

1. the extent to which the instructional program tracks the district objectives - text and materials as well as instructional content coverage are included here.

2. the extent to which item bank materials were (received and) used,

3. the instructional quality of the program, and

4. for Algebra 1 only, the scheduling practices and considerations by which students are enrolled into Algebra 1.

The by-school actual and residual means on the Life Science and Algebra 1 tests are displayed in Table I, following chart II. Also shown are the Stanford scale scores of the students taking the respective courses and the number of students at the school for whom both Stanford and subject area scores are available.[5]

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[5] The Stanford scale scores are not usually published and are probably unfamiliar. They are the scores used in the adjustment process, Reading for Life Science, Mathematics for Algebra 1. Unlike the percentile scores usually published, a scale score of a particular value, according to the test publisher, represents the same basic quantity of skill at each grade. For example, a seventh grader with a scale score of 700 has the same amount of math skill as a ninth grader with the same score, despite the fact that for the 7th grader the score is equal to the 78th percentile, and for the ninth grader the 53rd percentile. The Appendix displays by-grade percentile equivalents for selected Stanford scale scores.

Two critical characteristics of the residual scores warrant note. First, the average residual score for all students is mathematically zero, i.e. the actual scores minus the expected scores is zero for the district as a whole. Second, because the scores are based on district averages, they do not contain any information on the overall level of performance throughout the district. If the overall performance was high, the expectations would be high and the residual scores would reflect variation from this high level of performance. When overall performance is low, the expectations are low, and the residual scores reflect variation from this low level of overall performance.

Consider next the by-school adjusted means shown in Table I. The Life Science residual scores range from -2.2 to +2.4. This range of approximately 4 points encompasses about one ninth (1/9) of the content of the two 36-item tests. Differences of this magnitude are significant both educationally and statistically; however, only four of the 44 schools scored as much as two points above or below their expected scores. And given the fact that the overall test performance is low, these data also indicate that the problems with Life Science achievement are fairly systemic and affect all or nearly all schools.

For Algebra 1 the residual means are quite variable, -7.6 to +10.2. Junior high schools in general have higher average levels of actual achievement, smaller numbers of students enrolled, and the greater amount of variability in the residual Algebra 1 means. Generally, the senior highs' actual scores are lower; their residual scores are less variable, and the numbers of students enrolled are larger. Possible reasons for these junior-senior differences are discussed next.

Though not shown in the text there are grade-to-grade differences in the Algebra 1 scores even when the students have the same overall level of mathematics skill, i.e. the same Stanford scale scores. (It is for this reason that grade is used in the actuarial procedures.) In every case these differences favor the lower grade, grade eight scores higher than nine, nine than ten, and ten than eleven; eleven and twelve, for practical purposes, are equal.

Part of these grade-to-grade differences is likely due to differences in mathematics aptitude. The student who develops a specific quantity of skill by grade eight usually has more aptitude in that area than the student who develops the same quantity of skill by grade nine, and so on.

Particularly in the case of Algebra, interest and motivational differences are also likely to exist and to follow a general by-grade pattern. As examples, the typical student in eighth grade Algebra (Accelerated Algebra) is probably college bound and perhaps has interest in a field requiring considerable mathematics skill. These characteristics are probably slightly less applicable to the typical ninth grade algebra student. By grade eleven or twelve, the Algebra 1 student may still be interested in college but is not likely to have any (realistic) interest in mathematics or in a field requiring considerable mathematics skill.

The typical difference between grades eight and nine or ten and eleven is two to two-and-one-half points (11 and 12 are about equal) for Algebra students with average or above average Stanford scores. Thus, two to two-and-one-half points is a reasonable estimate of the combined effects of the interest and aptitude differences associated with grade. For the matriculation grades, nine

and ten, the difference is somewhat larger, about three-and-one-half to four points higher for the ninth grader than the comparable tenth grader. Thus there are the differences between the achievement of junior and senior high algebra students that extend beyond the effects of skill level, interest, and aptitude. That this additional effect exists is supported by examination of the adjusted means for the six senior highs (American, Miami Beach, Carol City, Edison, Northwestern, and South Dade) which include the ninth grade. All except one (Miami Beach) have a negative residual mean (range is -0.6 to -3.0).

There are also suggestions that one source of this additional difference may be selection/scheduling practices, i.e. who takes algebra. The seven senior highs with an average Stanford Mathematics scale score below 700 have negative residual means (ranging from -0.6 to -3.0). Thus, part of the junior-senior high difference may be that senior highs, representing the students last chance to take this college prep course, are more inclined than junior highs to let low aptitude/skill students take algebra; and that having done this they are, perhaps because of their size and the complexity of their schedules, less able or inclined to make the special adjustments made by the few junior highs who "successfully" schedule students with low levels of skill.

There is one other difference between junior and senior highs that may affect Algebra 1 instruction. At the junior highs Algebra 1 (at times along with Geometry) is the most advanced math course offered. And as earlier noted, it is usually reserved for the above average students.

In the senior highs, there are five math courses above Algebra 1 (Geometry, Algebra II, Math Analysis, and Calculus). Especially in those senior highs where "their" junior highs have already offered Algebra 1 to the "best" students, the course may be viewed somewhat differently than at the junior highs, particularly with pressure to "let the student try." This difference in turn may affect the selection of teachers for Algebra 1 and/or the attitudes and expectations of the teachers, and these factors could in turn affect the performance of students.

In any case, the net effect of these junior-senior high differences is that the ninth grader taking Algebra 1 in a senior high scores, on the average, 3.1 points below his/her similar cohort who takes the class in a junior high.

In addition to the grade-to-grade and junior-senior high differences several other points warrant note.

First, for Algebra 1 the variability of the adjusted means is strongly affected by the number of students enrolled. The most extreme adjusted means, e.g. -7.1, + 10.2, -7.6, +9.9, occur with small enrollments (about 50 or fewer students). There are a number of reasons why these affects can occur. Some of these are statistical, e.g. small samples can be inherently more variable than large samples. Other considerations are more practical in nature. Small enrollments (50 or less) very likely represent the effects of one or two teachers and very specific scheduling considerations. Brownsville (+10.2) and Allapattah (-7.1) are known to represent these phenomena.[6]

At Brownsville, the Algebra 1 teacher is also the school counselor, and Algebra 1 is the only class she teaches. More important, she personally selected the ten students, and had taught all of them seventh and/or eighth grade math prior to Algebra 1. Equally important, the teacher is very knowledgeable, very dedicated and skilled and has (and has had) the complete support of her principal. She also made extensive use of the test item bank material, but this is considered secondary.

At Allapattah, different considerations were employed, particularly for scheduling. As is obvious from the Stanford scores, the average Algebra 1 student has comparatively low levels of prior math achievement. Moreover, Algebra 1 students were distributed to three different classes; each class contained basic math, pre-algebra and Algebra 1 students. Quite simply, (pure) Algebra 1 classes did not exist. Clearly these scheduling practices (low level students and mixed classes) along with the instruction provided, are counter- productive when viewed in terms of students' success on the two Algebra 1 tests.[7]

In any case, the flexibility afforded by small enrollments, and employed at Brownsville, has been demonstrated. Schools with large enrollments could not employ such techniques and most use different approaches.

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[6] Discussion of individual schools is counter to a long standing testing practice of not describing results for specific schools. In this case it is necessary in order to document the latitude afforded by smaller enrollments.

[7] It is not intended that the selection and scheduling practices of either school be universally adopted or avoided. The Brownsville "methods" involve some very weighty issues; for example, what about the students who were not selected in grade seven or eight, or who will take Algebra 1 next year having not had the counselor-teacher for seventh and/or eighth grade math. In Brownsville these methods may (or may not) be the best overall solution. We do not know or pretend to know. In Allapattah we are sure that the combination of selection, scheduling, and instruction employed is counter productive, but the effects of the selection per se or instruction per se are indistinguishable with these data. We note simply that in the six junior highs (and all senior highs) where the Stanford scores were below 700, four had appreciable negative residual scores.

SUMMARY OF RESULTS AND RECOMMENDATIONS

For both Life Science and Algebra 1, the match between the content of the tests and the district objectives is sufficient to document the achievement of the district objectives at both the district and by-school levels.

LIFE SCIENCE

1. The average level of performance for the approximately 17,000 students was low; the average percent correct was slightly less than 46 percent (16.5 of the 36 items on each test). Thus, the average Life Science student correctly answered less than one half of the test questions based directly on the district objectives.

2. School averages were somewhat variable, ranging from a low of 31.1 percent correct to a high of 59.4 (11.2 to 21.4 items correct). No school had an average as high as 60 percent correct and quite a few (8 of 45) had averages below 40%.

3. When the schools' results were compared on an actuarial basis, taking into account students' prior achievement and ethnic membership, only four schools differed by as much as two points (above or below) the actuarial expectation. Thus a considerable part of the school differences in Life Science is due to the characteristics of the students they serve; for the majority of schools, educationally significant program effects do not occur in the Life Science area.

   The basic conclusion is that these are substantial problems in the Life Science area and that these problems are fairly systemic.

   The basic recommendation for Life Science is that a thorough program review be conducted. This review should cover, but not necessarily be limited to, the scope of the curriculum and objectives entailed in the course, the content adequacy of the texts and supplemental materials (provided by the Supervisor of Science), the extent to which instructional personnel can and do follow the district objectives, and the extent to which schools administrative personnel and the Science Department Head can and do support and monitor progress through these objectives.[8]

   An additional recommendation, intended for secondary mathematics as well as junior-high science department heads, is that a required, early-in-year inservice be provided to review the course objectives and supplementary

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[8] This latter part of the recommendation is not intended to imply that the school administration (particularly at the senior high level) or the department head should be able to closely monitor the content of each course. Because of the number and diversity of courses, this capability can only (on a cost effectiveness basis) come from the subject area supervisor/staff.

There are, however, a number of activities that can occur to facilitate the support and monitoring process. The attention given to the item banks provides one list of possible pitfalls in support and monitoring. In some few cases the item banks were not received by the principal but absence was not noted until after testing; in other instances they were placed in a "get to later file" and were never "gotten to"; in some instances the department head received but never distributed the materials to teachers; in still other cases the teachers' received but did not use the materials. Generally, teacher use of the materials was of their own choice.

materials (including item banks) for Life Science, Algebra 1 and Geometry (to be tested in 84-85), and that a similar required inservice be scheduled for principals (or curriculum assistant principals).

ALGEBRA 1

For Algebra both the results and the recommendations are more complicated because Algebra 1 is an elective and involves selection and scheduling students, and because it is taught to students in different grades (8-12).

1. The average level of performance for the approximately 10,500 Algebra 1 students was moderate; the average percent correct was slightly less than 55 percent (averaging 19.7 across the two 36 item tests).

2. There were significant grade-to-grade differences in the results. Consistently, the students in the lower grade (e.g., 8 vs 9, 10 vs 11) out performed the students in the next highest grade - except that performance in grades 11 and 12 was about equal. For students of the same level prior math skill, the typical difference between adjacent grades ranged from 2 to 2.5 points. As noted, part of this difference is probably due to aptitude and interest differences in the students at the various grades.

3. The differences before and after grade nine, however, were somewhat larger and more complex than those described above. This complexity arises from the fact that some ninth graders who take Algebra 1 take it in junior high while others take it in a senior high. When the actuarial controls were employed, they showed that the ninth grader at the senior high scored slightly over 3 points lower than his/her similar cohort taking the course in the same grade at the junior high.

4. There is evidence, that at some schools students without a sufficient level of prior mathematics achievement are being enrolled in Algebra 1. While the senior highs feel an understandable pressure to enroll the lower skilled student into Algebra 1 class. - Algebra is a college prep course - the data suggest that, in most instances, this tendency is counter productive insofar as Algebra 1 achievement is concerned.

5. Beyond the effects previously described, there are substantial differences in Algebra 1 achievement of similar students attending different schools. Across the schools with large Algebra 1 enrollments there are, however, achievement variations which encompass almost one-third of the content of the two tests, a substantial difference from both statistical and educational considerations. The overall conclusion on Algebra 1 is that the range in achievement is too large; too much of the Algebra 1 student's achievement is dependent on when and where the course is taken.

a) As recommended in the Life Science discussion, a required early-in-year inservice to review course objectives and supplementary materials, is recommmended for Algebra 1, Geometry, and Life Science. A similar inservice for principals (or curriculum assistant principals) is also recommended.

b) The selection and instructional procedures and the later success rates in Geometry and Algebra 2 should be reviewed for all schools where more than a fraction of students in Algebra 1 have Stanford stanines below 6 at the junior high level, or below 5 at the senior high level. A list of these schools will be provided to the Division of Elementary and Secondary Instruction prior to the beginning of the 1984-85 year.

c) The Algebra 1 programs of the six senior highs with grade nine students should be reviewed. Particular attention should be given to providing separate grade nine Algebra 1 classes.

d) Consideration should be given to designating two different sequences of advanced math courses, one sequence for grade eight and nine students, another for higher grade students.

e) Algebra 1 program reviews should be conducted for all schools that have residual scores more extreme than plus or minus 3.5 (see text) for enrollments of fewer than seventy students, or plus or minus 2.0 for more than seventy students. The content of these reviews should include selection and scheduling practices for students, the selection of instructional staff, and the school's emphasis on coverage of the district objectives.

A final consideration, not directly related to the analysis of the existing data, is the availability of subject area curriculum staff to accomplish these reviews and those that are probably needed in other areas, such as Chemistry, Biology, Geometry, Algebra II, and Math Analysis. Stated very simply, the numbers of staff in these two areas (one Supervisor and two Teachers on Special Assignment in mathematics and one Supervisor and a Teacher on Special Assignment in Science) are not sufficient for the tasks on hand.

CHART I
LIFE SCIENCE TEST RESULTS BY TOPIC
DADE COUNTY PUBLIC SCHOOLS
MAY, 1984

CODE	TOPIC	
A01	Use and care of laboratory equipment.	52.5
A02	Identify the parts of a controlled experiment.	44.7
A03	Make systematic observations and record data.	38.9
A04	Construct tables, graphs, and drawings from raw data.	82.6
A05	Differentiate between quantitative and qualitative data.	31.3
A12	Describe the life processes of living things.	45.7
A13	Identify the important structures of a cell and their functions.	45.6
A14	Describe the process of osmosis and diffusion.	33.4
A15	Investigate the process of cell division.	52.9
A16	Differentiate between the kingdoms.	34.2
A18	Identify the structures and functions of the parts of a plant.	73.6
A20	Determine ways to propagate various plants.	55.1
A22	Describe how living things obtain energy.	57.8
B01	Explain the basic characteristics of animal cells.	54.0
B02	Differentiate between the major phyla of animals.	46.9
B03	Describe the relationship between cell, tissue, organ, and system.	57.0
B04	Describe the major function of the skeletal system.	57.3
B05	Describe the function and structure of the three types of muscles.	48.4
B06	Explain the functions of the major parts of the nervous system.	37.1
B07	List the main constituents of blood and the major blood groups.	36.0
B08	Identify the major parts of the circulatory system.	43.9
B09	List the structures and functions of the alimentary canal.	37.7
B12	List the structures and functions of the excretory system.	35.1
B18	List the structures of the male and female reproductive systems.	46.9
B13	Define communicable diseases and list the major ones.	21.2

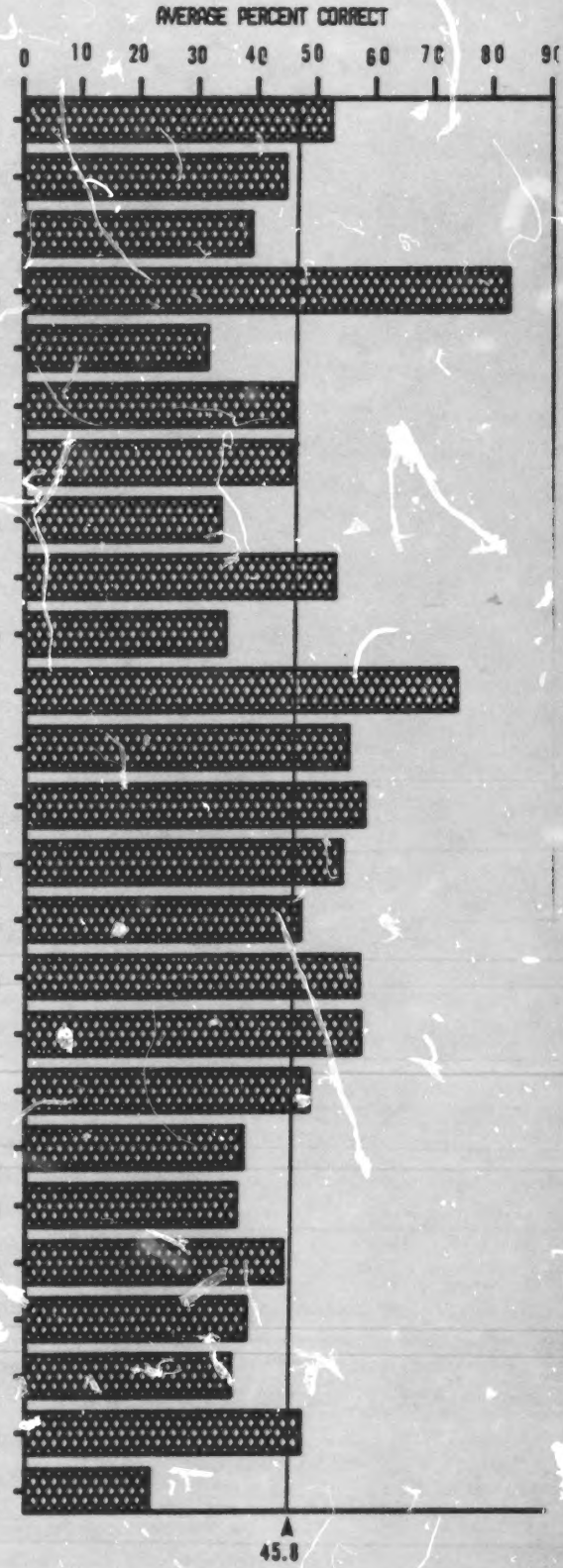

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CHART II
ALGEBRA I TEST RESULTS BY TOPIC
DADE COUNTY PUBLIC SCHOOLS
MAY, 1984

CODE	TOPIC	
I	Perform operations involving numbers, sets, and variables.	41.3
II	Solve and apply first degree, one variable equations/inequalities.	49.1
III	Graph linear equations/inequalities on coordinate grids.	61.1
IV	Solve and apply systems of linear equations.	47.4
V	Apply concepts of relations, functions, domains, functional notation.	61.0
VI	Solve problems using direct and indirect variation.	60.5
VII	Apply the laws of exponents to the operations of polynomials.	63.6
VIII	Apply and solve problems involving rational algebraic expressions.	59.3
IX	Apply and use irrational numbers and radical expressions.	49.3
X	Solve quadratic equations.	43.3

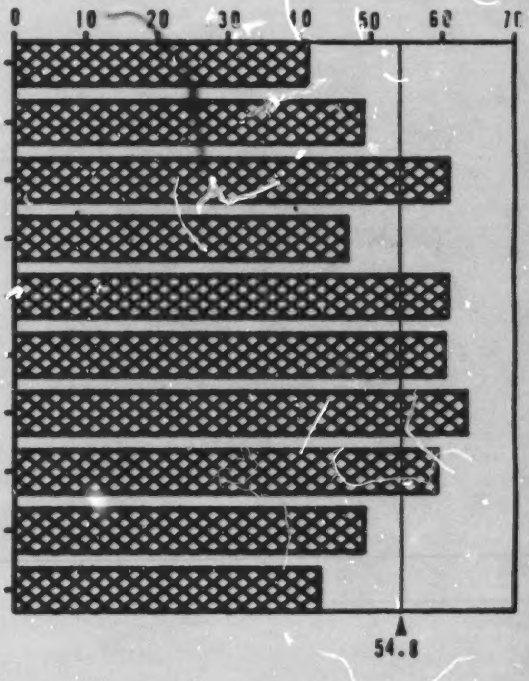

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TABLE I
BY-SCHOOL, MAY 1984, SUBJECT AREA RESULTS

School Name	LIFE SCIENCE Reading Scale Score	Num.	Res.	Actual Mean	ALGEBRA Math Scale Score	Num.	Res.	Actual Mean
Allapattah Jr	621	222	+1.7	15.2	674	46	-7.1	11.9
Arvida Jr	686	483	-0.1	19.4	719	349	0.0	23.9
Brownsville Jr	615	194	-1.9	11.2	717	10	+10.2	30.[illegible]
Carol City Jr	633	381	+0.6	15.6	697	22	-7.6	14.4
Campbell Drive Jr	645	220	-1.2	15.3	704	27	-2.9	21.2
Carver, G W Jr	665	360	-1.0	16.9				
Centennial Jr	665	259	+0.9	18.9	720	106	-0.9	22.5
Citrus Grove Jr	639	309	+2.2	18.1	713	60	+4.6	26.6
Cutler Ridge Jr	633	219	+1.3	19.2	730	68	+1.5	25.4
Drew, Charles R Jr	627	322	-0.4	13.6				
Filer, Henry H Jr	625	330	0.0	15.0	700	43	+4.3	26.2
Glades Jr	676	355	-0.7	18.4	738	136	+2.4	27.2
Hialeah Jr	645	293	-2.4	14.0	702	108	-2.3	19.8
Highland Oaks Jr	683	320	-0.7	18.7	739	179	+4.4	29.3
Homestead Jr	641	273	-1.1	15.1	727	24	-1.1	24.4
Jefferson, T Jr	656	259	+0.2	17.1	707	72	+0.7	24.0
Kennedy, J F Jr	666	298	+2.1	20.0	734	68	+2.3	26.8
Kinloch Park Jr	646	308	-0.2	16.0	718	59	-3.2	20.4
Lake Stevens Jr	637	401	-0.3	14.7	695	53	-2.4	19.1
Lee, Robert E Jr	626	228	-2.2	12.5	679	20	+9.9	24.7
Madison Jr	623	291	-1.2	12.9	709	23	+5.0	26.5
Mann, Horace Jr	639	309	-1.3	13.2	69[illegible]	46	-4.5	16.2
Mays Jr	646	221	-0.4	15.3	72[illegible]	25	+3.9	27.3
McMillan, H D Jr	671	522	+1.0	19.4	74[illegible]	228	+0.4	25.4
Miami Edison Middle	612	298	-0.3	12.9	669	21	+6.0	24.1
Miami Lakes Jr	663	506	-0.7	16.8	719	139	-0.6	23.2
Miami Springs Jr	653	317	-1.1	16.7	704	118	-0.6	21.8
Nautilus Jr	657	409	-1.6	15.4	736	64	+3.7	30.0
Norland Jr	656	298	+0.9	17.5	724	88	-1.9	21.0
North Dade Jr	628	247	-0.4	13.5	706	15	+0.6	22.3
North Miami Jr	660	333	-1.1	16.2	718	141	+0.9	24.1
Palm Springs Jr	639	526	+1.1	17.0	726	96	+0.1	23.5
Palmetto Jr	685	311	+1.6	21.4	752	233	+0.2	25.9
Parkway Jr	639	313	+0.6	15.4	710	23	+4.4	26.3
Ponce de Leon Jr					734	111	+0.4	25.2
Redland Jr	665	285	-0.6	17.7	741	32	-2.3	24.7
Richmond Heights Jr	649	309	+1.1	17.4	708	134	-0.7	21.4
Riviera Jr	655	385	+0.6	18.0	713	130	-1.3	21.9
Rockway Jr	657	262	-0.3	17.0	723	161	+1.5	25.6
Shenandoah Jr	634	296	-1.3	14.3	719	51	+3.3	26.5
Southwood Jr	683	302	+1.4	21.0	737	194	-0.8	23.9
South Miami Jr	660	236	+1.6	18.7	738	59	-1.6	23.1
Thomas, W R Jr	652	400	+1.0	18.3	723	81	+0.5	24.1
Washington, B T Jr	624	180	0.0	13.7	752	18	-1.8	22.8
West Miami Jr	649	281	+0.8	17.4	720	75	+1.7	25.2
Westview Jr	637	293	+0.5	15.4	706	17	-3.4	17.6
American Sr					69[illegible]	351	-3.0	14.4
Coral Gables Sr					699	294	-1.1	15.7
Hialeah Sr					710	319	-0.5	17.0
Hialeah-Miami Lakes Sr					710	354	-1.0	16.[illegible]
Homestead Sr					709	141	-3.6	17.0
Miami Beach Sr					709	228	-3.[illegible]	22.7
Miami Carol City Sr					698	212	-2.2	14.3
Miami Central Sr					692	167	-0.7	14.4
Miami Coral Park Sr					709	302	-2.4	15.3
Miami Edison Sr					691	180	-3.0	13.2
Miami Jackson Sr					683	183	-1.6	13.6
Miami Killian Sr					708	279	+4.4	21.5
Miami Norland Sr					704	266	+0.3	16.3
Miami Northwestern Sr					686	221	-0.6	13.8
Miami Palmetto Sr					716	210	-3.2	14.6
Miami Senior					716	217	+3.2	21.2
Miami Springs Sr					715	90	+2.1	19.9
Miami Sunset Sr					711	263	-1.3	16.6
North Miami Beach Sr					708	244	-0.2	15.6
North Miami Sr					701	194	-0.6	16.5
South Dade Sr					711	203	-1.6	17.4
South Miami Sr					702	271	+1.5	18.6
Miami Southridge Sr					714	159	+0.2	17.5
Southwest Miami Sr					717	284	+3.9	21.8

Explanation of terms:
Num.--Number of students with subject area and Stanford scores.
Actual--The actual mean for the school.
Res.--The residual mean for the school: the actual minus the expected mean.
Scale Score--Stanford scores expressed on a scale which allows statistical comparisons across grades. Theoretically, these range from 0 to 999, for grades PK through adult. These represent a skill level irrespective of grade.

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APPENDIX

By Grade Stanford Percentile Equivalents For Selected Scaled Scores

Grade		6		7		9		11	
Subject Area*		R	M	R	M	R	M	R	M
Scaled Scores	600	11	10	5	6	2	1	2	1
	700	85	85	75	78	66	55	45	35
	800	99	99	99	99	97	99	98	92

*R= Reading Comprehension
M= Mathematics Applications Grades 6 through 9
M= Mathematics Grade 11

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The School Board of Dade County, Florida adheres to a policy of nondiscrimination in educational programs/activities and employment and strives affirmatively to provide equal opportunity for all as required by:

Title VI of the Civil Rights Act of 1964 - prohibits discrimination on the basis of race, color, religion, or national origin.

Title VII of the Civil Rights Act of 1964, as amended - prohibits discrimination in employment on the basis of race, color, religion, sex, or national origin.

Title IX of the Education Amendments of 1972 - prohibits discrimination on the basis of sex.

Age Discrimination Act of 1967, as amended - prohibits discrimination on the basis of age between 40 and 70.

Section 504 of the Rehabilitation Act of 1973 - prohibits discrimination against the handicapped.

Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal and Florida State Law, Chapter 77-422, which also stipulates categorical preferences for employment.